

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Claims 1, 14 and 20 have been amended, claims 3, 8 and 19 canceled, and claims 21-24 have been added. Support for the amendments can be found in the specification at least at paragraphs [0001], [0009], [0046] and [0056] and Figs. 13 and 14.

Rejection under 35 USC §102

The Examiner has rejected claims 1-9 and 13-20 under 35 USC § 102 as being anticipated by Tepman et al. U.S. Patent No. 5,589,224 (hereinafter referred to as "Tepman.")

Applicants respectfully disagree and traverse this rejection.

As amended, applicants' invention is a shielding system and method of shielding a physical vapor deposition chamber, which includes the pedestal shield removably attached to a pedestal and movable therewith between the lowered and raised positions, whereby the pedestal shield resides below a top surface plane of the pedestal and has an outwardly and downwardly extending portion surrounding and extending from the pedestal toward the chamber lower walls and an outwardly and upwardly curving end extending toward the chamber side walls. By having the pedestal shield residing below a top surface plane of the pedestal, this provides the particular advantage in that the components do not interfere with the loading and unloading of the wafer into and out of the deposition chamber. The pedestal shield and sidewall

shield cooperate when the pedestal is in the raised position, to prevent line-of-sight deposition transmission from the sputter target to the side and lower walls of the deposition chamber.

Referring to the Tepman patent, as shown in Fig. 1 thereof, Tepman shows a sputtering chamber 2 with a substrate 14 positioned on a support member 16 is attached to a vertically movable elevator system 18 via screws 9—9. (See also, Fig. 2 and col. 2, ll. 37-46.) A wall-like cylindrical shield member 10 is mounted via screws 12—12 to a support ring 4, which is attached to the chamber wall 3 at one end thereof, and at the other end the shield member 10 has a horizontal bottom wall 13 parallel with a bottom wall of the sputtering chamber 2 with a flange 15 extending upwardly there from. (See, Fig. 1 and col. 2, ll. 47-61.) The upwardly extending flange 15 surrounds the periphery of the support member 16, leaving a space 17 between the flange 15 and support 16. (Col. 2, ll. 61-64.)

An annular shield ring 20 fits peripherally over the support 16 and includes a downward extending centering flange 22 that fits into opening 17 and an outer flange 23 parallel to flange 22, whereby the shield ring 20 is seated over and contacts the mating flange 15 of the shield member 10. (Figs. 1 and 3; Col. 3, ll. 14-31.) This annular shield ring 20 also has a raised, inwardly-extending roof 25 that overlaps the support 16 and protects the periphery of the substrate from inwardly traveling species (e.g., along direction 56). (Fig. 1; Col. 3, ll. 8-12 and 19-21.)

Tepman recites to position a substrate 14 on the support 16, the substrate is positioned on a robot blade 34 which is then inserted into the chamber through an opening in the chamber wall. Once therein, the substrate is positioned over the support 16, which is in a retracted (lowered) position, and an arrangement of pins 30—

30 are raised relative to the support member 16 to lift the substrate 14 off the robot blade 34. The robot blade is then withdrawn and the pins 30—30 lowered relative to the support member 16 to deposit the substrate onto spacer support pins 36—36. (See, Figs. 1, 2, 4 and 5; col. 4, ll. 1-42 and col. 5, ll. 20-40.) That is, in this embodiment of Tepman the pedestal does not move between loading-unloading and substrate processing positions as claimed.

Referring to Fig. 5 of Tepman, this shield arrangement includes a chamber 2 with a shield 60, a target 70, a pedestal 80, and a lifter 90. (Col. 5, ll. 50-53.) The shield 60 includes a first downwardly (vertically) extending cylindrical portion 100, a horizontal ledge portion 102 extending inward toward the substrate 14, and a second downwardly (vertically) extending flange 62 extending from the ledge portion 102. (Col. 5, ll. 53-62.) Tepman discloses that “[t]he pedestal 80 includes a circumferential groove 82 formed in the substrate receiving portion thereof, into which the flange 62 is selectively received,” whereby the groove is preferably U-shaped. (Col. 5, ll. 62-66.) That is, the circumferential groove 82 is a part of the pedestal 80 itself, not a separate and distinct component therefrom as is claimed. In Tepman, the extending flange 62 is received into the groove 82 of the pedestal 80, whereby together the shield 60 and pedestal 80 combine to shield the interior region of the chamber. (Col. 6, ll. 5-27.) In operation, a substrate 14 is supplied into the chamber 2 by a robot blade, lifter 90 moves pins 30 inwardly of the pedestal 80 to lift the substrate 14 off the robot blade, and then the pedestal 80 ascends to lift the substrate 14 off the pins 30 and to position the pedestal 80 such that the lower flange 62 of the shield 60 is received in the groove 82 of the pedestal 80. (Col. 6, ll. 34-45.)

It is submitted that Tepman does not anticipate nor render obvious the present invention since Tepman does not disclose, suggest or show claimed limitations of the present invention. In particular, Tepman does not disclose, suggest or show an annular shield ring 20 that resides below a top surface plane of the pedestal, as is claimed. Tepman discloses and shows in Fig. 1 a shield ring 20 having an extending roof 25 residing above a top plane surface of the support member 16, whereby the shield ring 20 is seated over and contacts the mating flange 15 of the shield member 10. As for Fig. 5 of Tepman, this shield arrangement includes the pedestal 80 itself acting as the shield, whereby a circumferential U-shaped groove 82 of the pedestal 80 receives the flange 62 of shield 60. In fact, Tepman even discloses that the shielding components of the chamber are the pedestal 80 and the shield 60. (Col. 6, ll. 64-67.) That is, it is submitted that with reference to Fig. 5 Tepman does not disclose or show a "pedestal shield" removably attachable to a pedestal. These are positively claimed and recited as two separate components.

In addition to the foregoing, applicants submit that Tepman does not disclose or suggest that its shield ring 20 is securely attached to a pedestal, let alone a pedestal isolator ring of the pedestal, as is currently claimed. With respect to Fig. 1, Tepman merely discloses that its shield ring 20 is mounted in removable fashion at the periphery of the substrate 14 by seating the two flanges over the mating flange 15 of the cylindrical shield means 10. There is no disclosure or depiction in the drawings that its shield ring 20 is removably secured or mechanically secured to a pedestal isolator ring of a pedestal via a mechanical connection, as is claimed. As for Fig. 5 of Tepman, the pedestal itself is one of the shielding components of the chamber. (Col. 6, ll. 64-67.)

Applicants also submit that Tepman does not disclose or suggest a bottom wall shield, in addition to a pedestal shield and a sidewall shield, whereby such a bottom wall shield has a lower portion extending along the chamber lower wall, and inward and outward portions extending upward from the bottom wall shield lower portion, as is currently claimed.

Rejection under 35 USC §103

The Examiner has also rejected claims 1-11 and 13-20 under 35 USC § 103(a) as being unpatentable over Tepman in view of Chung et al. U.S. Patent No. 6,171,453 (hereinafter referred to as "Chung.").

First, applicants would like to point out that on page 3 of the above-identified Office Action the Examiner recites that Tepman discloses that the pedestal shield 82 is attachable to the pedestal 18, citing col. 6, ll. 16-21. The Examiner then contradicts this statement at page 8 of such Office Action by then reciting that Tepman is limited in that the pedestal shield being attachable to the pedestal is not suggested. Applicants respectfully submit that both statements cannot be true.

To overcome the deficiency of Tepman not suggesting that the pedestal shield is attachable to the pedestal, the Examiner cites Chung stating that this reference teaches a pedestal shield 84 being attachable to a pedestal 82, citing col. 6, ll. 59-64.

Chung discloses a shielding system for a physical deposition chamber in which clamp ring 44 cooperates with lower chamber shield 48 (Figs. 3A and 3B), clamp ring 64 cooperates with lower chamber shield 68 (Figs. 5A and 5B) and pedestal shielding ring 84 cooperates with lower chamber shield 48 (Figs. 6A and 6B). However, the cooperation between these parts only takes place when the pedestal 42 or 82 is in the

lowered or "release position." In the raised or "process position" described in Chung, the aforementioned parts are separated, and there is no cooperation. This is precisely opposite to applicants' system and method, where the pedestal shield and sidewall shield cooperate when the pedestal is in the raised deposition processing position.

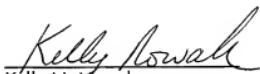
Unlike that of the presently claimed invention, Applicants submit that the pedestal shielding ring 84 of Chung resides above the top surface plane of the pedestal. Also, Chung does not disclose or suggest that its shielding ring is securely attached to a pedestal isolator ring of the pedestal, as is currently claimed. It is also submitted that Chung's shield 48 does not have a lower end that is above the pedestal, when the pedestal is in the lowered position, a distance sufficient to permit a wafer to be horizontally loaded onto the pedestal. If Chung's chamber shield 48 had a lower end that was above the pedestal when the pedestal is in the lowered position, it would not have to be removed for horizontal loading of the wafer. Accordingly, Chung's disclosed shielding ring does not meet the limitations of the presently claimed invention.

It is further respectfully submitted that Chung does not disclose or suggest a bottom wall shield, in addition to a pedestal shield and a sidewall shield, whereby such a bottom wall shield has a lower portion extending along the chamber lower wall, and inward and outward portions extending upward from the bottom wall shield lower portion, as is claimed.

In view of the foregoing, applicants respectfully submit that neither Tepman nor Chung, alone or in combination, anticipate or render obvious the present invention.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,


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